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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/713,671	11/13/2003	Dmitri Simonian	TI-62963	9864

23494 7590 03/10/2008

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EXAMINER
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ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
03/10/2008	ELECTRONIC

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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/713,671
Filing Date: November 13, 2003
Appellant(s): SIMONIAN ET AL.

Charles A. Brill
For Appellant

EXAMINER'S ANSWER

1. This is in response to the appeal brief filed December 10, 2007 appealing from the Office action mailed February 08, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner.

All grounds of rejection including the reference Chinn et al. (6,830,950) have been withdrawn.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,951,769	MALONE	10-2005
7,045,170	HANKINS ET AL.	05-2006
5,512,374	WALLACE ET AL.	04-1996

ASHURST ET AL., "WAFER LEVEL ANTI-STICTIONCOATINGS FOR MEMS", SENSORS AND ACTUATORS A 104(2003), PAGES 213-221

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

Claims 1-6,8-13,15-18,20,23-30 and 84-89 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170).

Ashurst et al., Wafer level anti-stiction coating for MEMS" teaches applying dichlorodimethylsilane (DDMS) anti-stiction coating on MEMS devices (abstract). Silicon samples are rinsed in acetone and cleaned with UV and ozone (UVO), treated with HF and UVO cleaned again prior to depositing the DDMS coating thereon. The pressure is reduced to less than 10 mTorr for plasma UVO cleaning. Water gas is also utilized during the cleaning process. Next the chamber pressure raised and DDMS is introduced to form the anti-stiction layer (pgs. 8-9). Hydrogen peroxide is also taught as a known cleaning agent for silicon surface prior to forming anti-stiction coatings (pg. 4)

Ashurst et al., Wafer level anti-stiction coating for MEMS" fails to teach cleaning the MEMS with ozone without the use of UV.

Hankins et al. (7,045,170) teaches the silicon surface of the MEMS device 310 can be cleaned prior to deposition of the anti-stiction coating. A variety of methods can be used to clean the surface, depending on the residual or surface termination left by the fabrication of the MEMS device 310. These cleaning methods include heating the MEMS device 310 at ambient pressure to a temperature greater than 100°C in an inert environment, heating the MEMS device 310 at sub-ambient pressure and less than 100°C in an inert environment, placing the MEMS device 310 in a dry environment for a period of time, cleaning surface residuals with a vapor-phase ozone system, and cleaning the surface with an oxidizing plasma.

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Ashurst et al., Wafer level anti-stiction coating for MEMS" pre-treating process by treating the MEMS device with ozone absent UV assistance and a the claimed temperatures with the expectation of achieving a cleaned surface for subsequent anti-stiction deposition as evidenced by Hankins et al. (7,045,170).

Claims 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170) further in combination with Wallace et al. (5,512,374).

Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170) fail to teach the anti-stiction coating being perfluoropolyether.

Wallace et al. (5,512,374) teaches perfluoropolyether coating for eliminating sticking and adhesion in MEMS devices (abstract).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170) process by substituting on anti-stiction agent (DDMS) for another (PPFE) with the expectation of achieving similar success as evidenced by Wallace et al. (5,512,374).

Claims 31-39,43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170) further in combination with Malone (6,951,769).

Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170) fail to teach the MEMS device being placed in an assembly and then into the chamber for cleaning/coating.

Malone (6,951,769) teaches mounting MEMS devices on an assembly substrate and coupling an assembly lid to the assembly substrate and over the MEMS devices to create an interior of the MEMS device. The MEMS device can be contacted through an opening (abstract and Figs.).

Therefore it would have been obvious for one skilled in the art at the time the invention was made to have modified Ashurst et al., Wafer level anti-stiction coating for MEMS" in combination with Hankins et al. (7,045,170) chamber to have placed the MEMS device in

assembly for cleaning/coating as evidenced by Malone (6,951,769) with the expectation of achieving similar results

(10) Response to Argument

Appellant argued independent claims 1 and 85 that Ashurst et al., Wafer level anti-stiction coating for MEMS" fails to teach the claimed cleaning step as the citation detailed by the Examiner are directed toward preparing the silicon substrate prior to forming the micromechanical device.

The Examiner agrees in part. While the citations are directed toward that which Appellant argues, the citation further teaches an O_2 plasma cleaning step at 300 mTorr followed by a second treatment step with the addition of water gas at a pressure of 500 mTorr. This clearly teaches the claimed pressures with the second pressure being higher than the first pressure. Furthermore, the fact that water is dosed into the chamber which over time displaces the oxygen to leave surfaces hydroxyl terminated does not negate the fact that the cleaning process includes the claimed water vapor. The water gas is clearly taught as being present during the O_2 plasma as Ashurst et al., Wafer level anti-stiction coating for MEMS" states "While the O_2 plasma is on, water gas is dosed …"

Appellant argued that claims 26 and 27 are not taught by the prior art as independent claim 1 from which these claims depend is not taught.

The Examiner disagrees. See reasoning directed above in rejecting the independent claim.

Appellant argued that the micro-opening of the claimed invention is different than that disclosed by the assembly of Malone.

In response to this, the claimed limitations of "forming a micro opening between a first substrate and a second substrate, whereby the second substrate is glass having a reflective and

detectable mirror plates formed thereon" is met by Malone. Malone teaches a first substrate (225) and a second substrate (205) whereby the second substrate has a micromachined device attached thereto having a "mirror array 100" thereon. Therefore, the limitation of having a "second substrate is glass having a reflective and detectable mirror plates formed thereon" is met. Furthermore, Appellant's argument concerning the instant claims Figs. 3 and 4 being different than Fig. 2C of Malone, is not commensurate in scope with the arguments. The claims do not require "gaps in a bonding material (107) define the micro-opening". Even assuming so, Malone teaches the opening (240) can be formed by applying a non-continuous bead of adhesive material between (205) and (225) (col. 3, lines 55-63).

(11) Related Proceeding(s) Appendix

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

//Brian K Talbot//

Primary Examiner, Art Unit 1792

Conferees:

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